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cases, the dangerous crossings. A very common feature of these acts is the power conferred upon the local authority to purchase the railway property at the expiration of a term of twenty-five or thirty years, or at the expiration of any period of seven years thereafter. In these cases the company is to be paid for the value of the tramway as "a going concern," without any allowance for compulsory purchase.

On the whole, the volume is both interesting and valuable to the student of the relations between communities and railway companies. It brings together a great mass of provisions, and, although omitting any comment on them, gives a useful analysis and digest of the various clauses.

C. E. MERRIAM.

Economics of Forestry : A Reference Book for Students of Political Economy and Lay Students of Forestry. By BERNHARD E. FERNOW. New York: Thomas Y. Crowell & Co., 1902. 8vo, pp. xii + 520.

THE progressive destruction of the forests in the United States has frequently been deprecated, and a considerable literature has gathered about the subject, but much of the discussion has been scattered through the periodicals or half-concealed in public documents of which, for want of due advertising, most people know little or nothing. A work which presents comprehensively and well a subject of so great practical and immediate interest should receive a hearty welcome.

Mr. Fernow does not, of course, countenance the popular delusions as to the influence of forests, which constitute so large a part of the current discussion. There is, he says, no trustworthy reason for thinking that forests increase rainfall (indeed, it is difficult to understand why such an effect should ever have been imagined). The chief climatic effect of forests is that of a windbreak—in addition to an influence upon temperature or moisture which is purely local and not comparable to that of the oceans, winds, and mountain ranges. Regarding the influence of trees on waterflow there have been extravagant claims made, and other factors which influence water flow—as topography and geologic structure—have often been given less consideration than they deserve. But trees, and yet more the forest floor with its litter, have a very great importance in retarding the drainage from rain or melting snow, and thus moderating the alternation of flood and drought. It is estimated that in the United States the annual erosion ruins 200 square miles of more or less fertile soil, and the effect of deforestation in this respect has in certain instances been plainly exhib-

ited; in France, for example, where "as a consequence of reckless denudations in the Alps, Cevennes, and Pyrenees, whole communities became impoverished by the torrents which destroyed and silted over the fertile lands at the foot of the mountains. Some 8,000,000 acres in twenty departments were involved in these disastrous consequences of forest destruction on over 1,000,000 acres of mountain slopes."

Mr. Fernow discusses again, as extravagant, certain common opinions regarding the sanitary influence of forests. "The amount of oxygen which they exhale is insignificant and is probably offset by the increase of carbonic acid from decomposing organic matter. Then it was claimed that by the transpiration of the foliage, wet ground may be drained and thus made healthier, and the Eucalyptus plantations at the monastery of Tre Fontane in the Campagna Romana are frequently cited as having removed the malarial conditions of that region. As a matter of fact, the fevers still occur, even under the Eucalyptus plantation, although more rarely." This improvement seems attributable to the rebuilding of the old Roman drainage canals which had been allowed to collapse, and because the malaria-breeding mosquitos have been reduced thereby. Nevertheless, forests have a sanitary influence, but mainly of negative character, from the absence of smoke, dust, obnoxious gases, and strong winds. It has also been found that forest air is less charged with pathogenic microbes than is other air. Those bacilli, especially which develop in the soil, like the cholera, typhus, and yellow-fever bacilli, find in the forest soil conditions unfavorable for development. "In fact, in the dense forest, where the variation of soil moisture is small and decomposing humus keeps the soil acid, no pathogenic microbes have been as yet found."

With proper management and fire protection forest property may yield a good income—5 per cent. it is calculated; and although the work of destruction has left a visible supply of timber sufficient only for the demands of thirty-five to fifty years, Mr. Fernow would still for the most part leave to private enterprise the management of forests as a source of supply, but in the case of "protection forests" the force of private interest is less to be trusted and the argument for interference by public authority is correspondingly more urgent.

The forest policy of America has hardly more than begun to develop. Several excellent schools have been established, and the federal government has undertaken a proper service in giving instruction as to methods of tree culture, but the general property tax of the states the tariff combines with to induce deforestation, while the efforts of the state

and national governments to encourage tree planting have been generally ill-considered and trivial.

Where forest growth is indispensable to the public welfare, the state should interfere compulsorily. Thus in France, Italy, Switzerland, and Austria denuded mountains are reforested by the landowners under pressure of law, but with the financial aid of the governments.

Where, on account of the smallness of separate holdings, a good forest management could not be maintained, coercive co-operation may recommend itself, or else the state, having a well-officered forest administration, may undertake the management for the owner, at least for the time. Where reforestation becomes necessary, it has usually been considered incumbent upon the state either to reimburse, or at least to alleviate the burden of reforestation, by relieving from taxation for a given time, as is done in France for thirty years and in Austria for twenty-five years, or by the granting of bounties on plantations. . . . Finally, however, it will be found that control and supervision of private property is an expensive and only partially satisfactory method . . . where the necessity of maintaining a forest growth may exist and the financial margin from it is small. Experience in the old countries has shown that in spite of the much more perfect machinery for enforcing laws, and the much more ready disposition to submit to laws, the attempts to control private property have been largely without the desired result. It then becomes preferable for the community (the state or some municipal body) to own and manage forest areas,

obtaining possession by an exercise of eminent domain if the land cannot be got by purchase. In an ideal arrangement the community would "own or control and devote to forest crops all the poorest soils and sites, leaving only the agricultural soils and pastures to private enterprise."

It may seem ungraceful to find fault with the literary character of a work which is, of course, to be judged chiefly as a scientific treatise and which bears that test of criticism so well, but it cannot be denied that the English in this book is hasty and at times obscure. Thus the expression (p. 76) "in the United States the amount of erosion at present may be estimated at 200 square miles per year," is unintelligible without a rather forced interpretation. So (p. 87), "We have learned that in general all conditions in nature are interrelated;" and (p. 3), "agriculture production is almost entirely dependent on human effort" (in contrast with the work of nature). It is also rather questionable to classify the "protective" function of forests—in modifying climate, soil, and waterflow—as "immaterial" in contrast with the function of supplying wood, which is described as a "material" function.

A. P. WINSTON.